IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Attorney 15145US02

In the Application of: Rao	)	**Electronically Filed**
U.S. Serial No.: 10/717,418	)	
Filed: 11/19/2003	)	
For: REDUCTION OF MEMORY REQUIREMENTS BY DE-INTERLEAVING AUDIO SAMPLES WITH TWO BUFFERS	)	
Examiner: Flanders	)	
Group Art Unit: 2614	)	
Confirmation No. 7778	)	

APPEAL BRIEF

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Sir:

This is an appeal from the Office Action made Final mailed October 14, 2008 in which claims 1-28 were rejected. A Notice of Appeal was filed with the United States Patent and Trademark on February 14, 2009.

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I. REAL PARTY IN INTEREST

Broadcom Corporation, a corporation organized under the laws of the state of California and having a place of business at 16215 Alton Parkway, Irvine California 92618-3616, has acquired the entire right, title, and interest in and to the invention, the application, and any and all patents to be obtained therefore, as set forth in the Assignment filed with the present application and recorded on 3/10/2004 at Reel/Frame 014417/0420.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF THE CLAIMS

Claims 1-18 were rejected under 35 U.S.C. 103(a) as being obvious from U.S. Patent Publication 2001/0041062.

Claims 1-4, 7, 9, 14, and 16 are appealed.

IV. STATUS OF AMENDMENTS

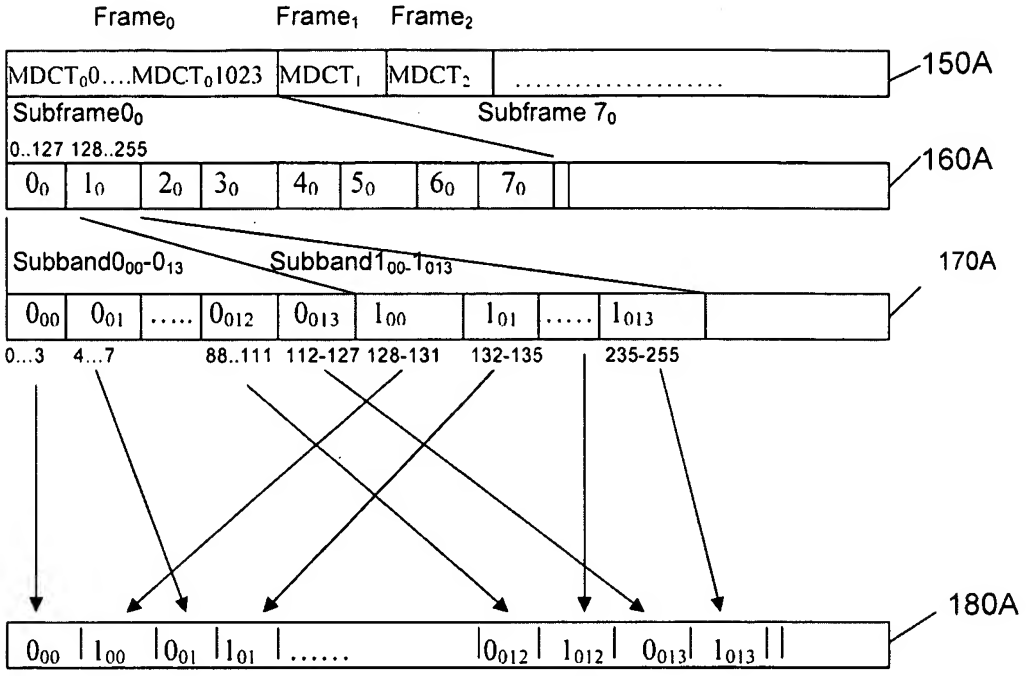
There are no pending amendments.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 of the invention is directed to a method of reducing memory requirements by de-interleaving audio information using status and dynamic buffers. The method comprises:

Writing interleaved first audio channel information to a first static memory device. Interleaved first audio channel information is described, for example, in Figure 1A and paragraphs 0041-0045.

Figure 1A is shown below:



Writing interleaved first audio channel information to a first static memory device is described in paragraph 0052 ("Initially, a portion of an audio stream comprising interleaved left channel audio frequency coefficients may be written into a first static memory device 610; see also Figure 3, first row). Figure 6, first row:

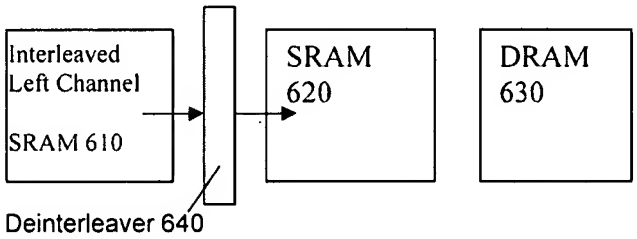


Figure 3, First Row

De-interleaving the first audio channel information which is described in the specification, for example, at 0052 ("The interleaved left channel audio frequency coefficients may then be interleaved by a de-interleaving engine 640").

Writing de-interleaved first audio channel information to a second static memory device, which is described, for example, at paragraph 0053 ("When all of the left channel audio frequency coefficients have been de-interleaved, the first static memory device 610 contains the interleaved audio information and the second static memory device 620 contains the de-interleaved audio information."; See also, Figure 3, Second Row).

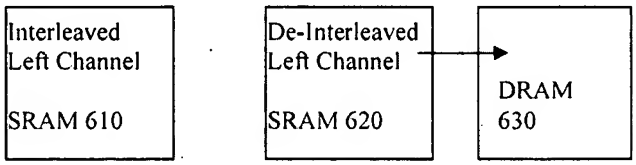
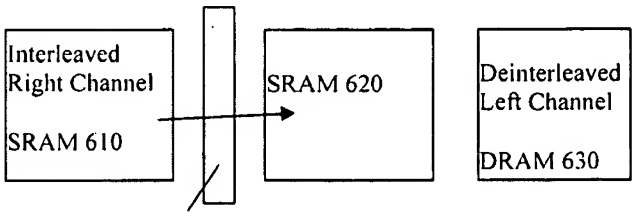


Figure 3, Second Row

Writing de-interleaved first audio channel information to a dynamic memory device from the second static memory device which is described in the specification, for example, at 0054 ("the de-interleaved left channel audio frequency coefficients may be written to a DRAM dynamic memory device 630 for temporary storage", See also, Figure 3, second row).

Overwriting interleaved first audio channel information with interleaved second audio channel information in the first static memory device, which is described, for example, in paragraphs 0054 and 0055 ("In order to make room for de-interleaving the right channel audio frequency coefficients, the de-interleaved left channel audio frequency coefficients may be written to a DRAM dynamic memory device **630** for temporary storage."; "When the interleaved right channel audio frequency coefficients have been de-interleaved, the first SRAM **610** contains the interleaved right channel information, the second SRAM contains the de-interleaved right channel information"; see also Figure 3, third row).



Deinterleaver Engine

FIGURE 3, Third Row

De-interleaving second audio channel information, which is described, for example at paragraph 0055 ("the interleaved right channel audio frequency coefficients may be de-interleaved by the de-interleaving engine", see also Figure 3, third row).

Writing de-interleaved second audio channel information to the second static memory device, which is described, for example, at 0055 ("When the interleaved right channel audio frequency coefficients have been de-interleaved, the first SRAM 610 contains the interleaved right channel information, the second SRAM contains the de-interleaved right channel information"; see also Figure 3, third row).

Overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device, which is described in the specification, for example, at paragraph 0056 ("the interleaved right channel audio frequency information in the first SRAM static memory device 610 is overwritten by the de-interleaved left channel audio frequency information").

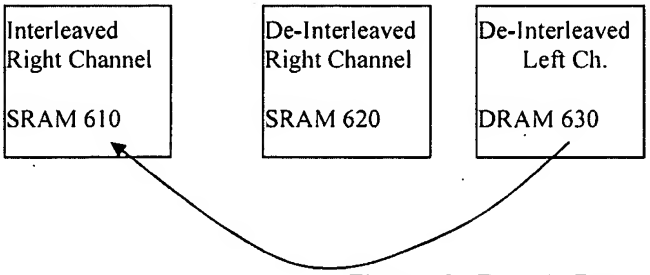


Figure 3, Fourth Row

Decoding the first and second audio channel information, which is described, for example, at paragraph 0058 ("The de-interleaved right and left channel audio frequency information pass through the decoding stages such as M/S decoding, Intensity coupling decoding, TNS, and filter bank, individually, generating the final PCM samples for the left and right channels respectively in audio decoder 666.").

Claim 5 is directed to a system for de-interleaving audio information with static and dynamic buffers. The system comprises:

A first static memory device which is described for example in Figure 3, 610.

A de-interleaving engine which is described, for example, in Figure 3, 640.

A second static memory device which is described for example, in Figure 3, 620.

A dynamic memory device, which is described, for example, in Figure 3, 630; and

An audio decoder, whereby interleaved first audio channel information is written into the first static memory device (see, Figure 3, first row, first column, de-interleaved by the de-interleaving engine (see, Figure 3, 640), written into the second static memory device (see Figure 3, second row, second column), and temporarily stored in the dynamic memory device (see Figure 3, third row, third column, and last row shows "De-Interlaced Left Channel" transferred to "SRAM").

Claim 12 is directed to an application specific integrated circuit for de-interleaving audio information, the circuit comprising:

A first static memory device operatively connected to a de-interleaving engine which is described for example in Figure 3, 610, 640.

A second static memory device also operatively connected to the de-interleaving engine which is described, for example, in Figure 3, 620, 640.

A dynamic memory device operatively connected to the first and second static memory devices, which is described, for example, in Figure 3, 630; and

An audio decoder operatively connected to the first and second static memory devices and the dynamic memory device, whereby interleaved first audio channel information is written into the first static memory device (see, Figure 3, first row, first column, de-interleaved by the de-interleaving engine (see, Figure 3, 640), written into the second static memory device (see Figure 3, second row, second column), and temporarily stored in the dynamic memory device (see Figure 3, third row, third column, and last row shows "De-Interlaced Left Channel" transferred to "SRAM").

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claim 1, 7, and 14 are obvious under 35 U.S.C. § 103(a) from Ottesen.

Whether claims 2, 9, and 16 are obvious under 35 U.S.C. § 103(a) from Ottesen.

VII. ARGUMENT: THE REJECTION TO CLAIM 1 SHOULD BE REVERSED CLAIMS 1-4 WERE REJECTED UNDER 35 U.S.C. 103(A) AS BEING OBVIOUS FROM OTTESEN.

Claim 1 is reproduced as follows:

1. A method of reducing memory requirements by de-interleaving audio information using static and dynamic buffers, the method comprising:

writing interleaved first audio channel information to a first static memory device;

de-interleaving the first audio channel information;

writing de-interleaved first audio channel information to a second static memory device;

writing de-interleaved first audio channel information to a dynamic memory device from the second static memory device;

overwriting interleaved first audio channel information with interleaved second audio channel information in the first static memory device;

de-interleaving second audio channel information;

writing de-interleaved second audio channel information to the second static memory device;

overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device; and

decoding the first and second audio channel information.

A. THE REJECTION TO CLAIM 1 SHOULD BE REVERSED BECAUSE EXAMINER HAS NOT EVEN ESTABLISHED A PRIMA FACIE CASE OF OBVIOUSNESS.

In the Final Office Action, it was conceded that Ottesen does not explicitly teach the following claimed limitations:

overwriting interleaved first audio channel information with interleaved second audio channel information in the first static memory device;

de-interleaving second audio channel information;

writing de-interleaved second audio channel information to the second static memory device;

overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device; and

decoding the first and second audio channel information.

Examiner has indicated that the foregoing are notoriously well known:

(1) "in cable systems to provide audio streams with more than one channel of sound";

(2) "reuse memory space (i.e., space used by the input buffer in this case and other memories of fig. 10) in order to accommodate new data."

Assignee respectfully submits that even if the foregoing are correct (which Appellant does not admit), the prior art would still fail to show "overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device".

Appellant respectfully notes that, initially, the first static memory as claimed stores interleaved data, that is data that is awaiting deinterleaving. Also, as per the claim language, the "deinterleaved first audio channel information" is initially stored in the dynamic memory. Appellant respectfully submits that even if it was notoriously well known to "reuse memory space ... in order to accommodate *new* data", in the claim language "overwriting interleaved second

audio channel information in the first static memory with *de-interleaved first audio channel information from the dynamic memory device*", (1) the de-interleaved first audio data is not *new* data; and (2) the de-interleaved first audio data is already accommodated for.

The Non-Final Office Action stated that "it is known to reallocate portions to operate and receive data dynamically depending on the program; thus it is obvious to reallocate the memory used for the input buffer as the output buffer and vice versa". Appellant traversed this finding in the following response and the Final Office Action provides the Weigelt reference as evidence, and indicated that in Weigelt:

> If a memory system has 10 banks, one program may use banks 1-3, another may use 4-10. If those programs no longer need to use those banks, they will be released to the system. If this did not happen, the resources would never be available to use by the system for other programs and would be extremely inefficient.

However, supplying the Wiegelt reference still does not establish "overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device" in the prior art. As is noted in the Final Office Action, "<u>If those programs no longer need to use those banks</u>, they will be released to the system". However, what the foregoing does not establish is overwriting an input ("interleaved second audio channel data) with already stored output ("deinterleaved first audio channel information" in the dynamic memory) from the <u>same</u> function (the deinterleaver).

This, for at least the foregoing reason, the rejection does not even assert that the prior art teaches all of the limitations, especially "overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device".

B. THE REJECTION TO CLAIM 1 SHOULD BE REVERSED BECAUSE OTTESEN DOES NOT TEACH "WRITING INTERLEAVED ... INFORMATION" OR "DE-INTERLEAVING THE ... INFORMATION"

The Final Office Action alleges that Ottesen teaches "writing interleaved channel ... information to a first static memory device (storing non sequential data into input buffer 66; paras 182 and Fig. 11).

"[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313, 75 USPQ2d 1321, 1326 (Fed. Cir. 2005) (*en banc*); see also, MPEP 2111.01.

"Interleave" is defined as "to arrange in or as if in alternate layers." http://www.merriam-webster.com/dictionary/interleaved. "Alternate" is further defined as "(1) occurring or succeeding by turns <a day of alternate sunshine and rain>, 2a: arranged first one one side and then on the other at different levels or points along an axial line... 3: every other: every second <he works on alternate days> 4: constituting an alternative". http://www.merriam-webster.com/dictionary/alternative.

Assignee respectfully submits that "interleaved" does not read on *merely* non-sequential. It is noted that a random mixing data would make the data non-contiguous, but not interleaved. Accordingly, Assignee respectfully submits that Ottesen does not teach or fairly suggest "writing interleaved ... information" or "deinterleaving ... the information".

C. THE REJECTION TO CLAIM 1 SHOULD BE REVERSED BECAUSE OTTESEN TEACHES AWAY FROM THE PROPOSED COMBINATION

Even if the "interleaved" where deemed to mean "non-sequential", for the sake of argument, the rejection to claim 1 should be reversed because Ottesen

teaches away from the proposed combination. The rejection indicates that Ottesen teaches:

writing interleaved first audio channel information to a first static memory device (storing non sequential data into input buffer 66; paras 182 and Fig. 11);

:

writing de-interleaved first audio channel information to a second static memory device (i.e., writing segments A1 and A2 in their proper contiguous locations; para 184-186);

writing de-interleaved first audio channel information to a dynamic memory device from the second static memory device (i.e., transferring the data from DASD to the output buffer; fig. 11)."

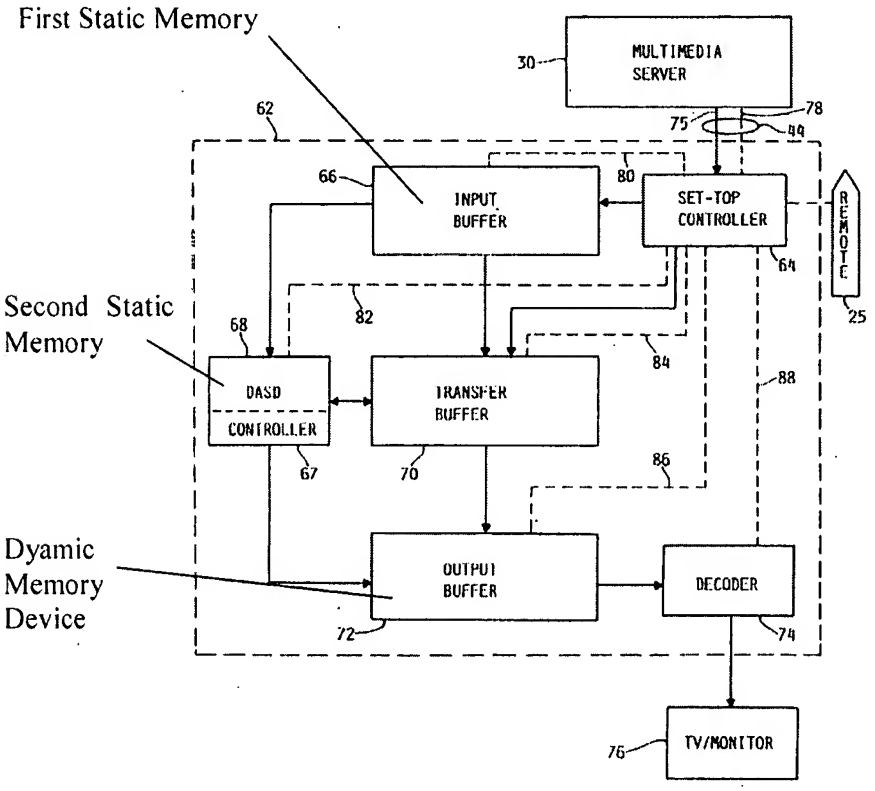


FIG. 11

Ottesen, Figure 11 – Annotated

Ottesen, Figure 11 is shown above, and is annotated with what the Office Action alleges are the first static memory, second static memory, and dynamic memory.

If, for the sake of argument, the allegations in the Office Action are correct (which Appellant does NOT concede), then "overwriting interleaved second audio

channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device" would mean that data would be transferred from the output buffer to the input buffer.

Appellant respectfully submits that there would be no reason to do this. First, transferring data from the output buffer 72 to the input buffer 66 would not accommodate the new data, in fact it would impede reception of new data. It also would not result in any memory savings, since the input buffer, DASD, and output buffer are all still used.

Moreover, doing so would render Ottesen inoperable – the first interleaved/deinterleaved data would be sent in an endless loop and could not be decoded by the decoder 74. Accordingly, Assignee respectfully submits that one skilled in the art, even with a teaching of "overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device" would not so modify Ottesen for the foregoing reasons.

It is further noted that the Weigelt reference, relied on to establish that "it is obvious to reallocate the memory used for the input buffer to operate as the output buffer and vice versa", is characterized as teaching "If those programs no longer need to use those banks, they will be released to the system. If this did not happen, the resources would never be available to use by the system for other programs and would be extremely inefficient." In Ottesen, a system for providing media to the TV/monitor, would clearly operate on a stream of incoming data from the server 30. As a result, the "program", to change non-continuous data to continuous, would need the input buffer 66, so long as the media was being provided to the TV/monitor.

D. THE REJECTIONS TO CLAIMS 7 AND 14 SHOULD ALSO BE REVERSED

For at least the foregoing reasons, Appellant respectfully requests that the rejections to claim 1, and dependent claims 2-4 be REVERSED. Additionally, the rejections to claims 7 and 12, reciting among other limitations, "wherein the interleaved second audio channel information in the first static memory device is

overwritten by the de-interleaved first audio channel information from the dynamic memory device."

VIII. ARGUMENT: THE REJECTION TO CLAIM 2, 9, AND 16 SHOULD BE REVERSED

Claim 2 is as follows:

> 2. The method according to claim 1, wherein the first audio channel information and the second audio channel information comprise similar audio information from adjacent sub-frames.

Claim 2 was rejected under 35 U.S.C. 103(a) as being obvious from the combination of Ottesen. The Office Action notes that Ottesen teaches "wherein the first audio channel information and the second audio channel information comprise similar audio information from adjacent sub-frames (i.e., first and second channel audio of the television signal typically includes L and R audio, which can be considered substantially similar)."

Appellant requests reversal because no showing is made regarding "adjacent sub-frames". It should be noted that in "first audio channel information" and "second audio channel information", "first" and "second" modify "information", as opposed to "channel". See Figure 1A for an illustrative example of adjacent sub-frames. L and R audio channels would not have *adjacent* sub-frames.

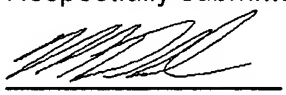
Accordingly, for at least the foregoing reasons, Appellant respectfully requests that the rejection to claims 2, 9, and 16 be REVERSED.

IX. CONCLUSION

For at least the foregoing reasons, the Board of Patent Appeals and Interferences is respectfully requested to REVERSE the rejections to claims 1-4, 7, 9, 14, and 16.

Dated: February 26, 2007

Respectfully submitted,



Mirut P. Dalal
Registration No. 44,052
Attorney for Appellant

McANDREWS, HELD & MALLOY, LTD.
500 West Madison Street, 34th Floor
Chicago, IL 60661
Telephone: (312) 775-8000
Facsimile: (312) 775-8100

CLAIMS APPENDIX

CLAIMS

1. A method of reducing memory requirements by de-interleaving audio information using static and dynamic buffers, the method comprising:

writing interleaved first audio channel information to a first static memory device;

de-interleaving the first audio channel information;

writing de-interleaved first audio channel information to a second static memory device;

writing de-interleaved first audio channel information to a dynamic memory device from the second static memory device;

overwriting interleaved first audio channel information with interleaved second audio channel information in the first static memory device;

de-interleaving second audio channel information;

writing de-interleaved second audio channel information to the second static memory device;

overwriting interleaved second audio channel information in the first static memory with de-interleaved first audio channel information from the dynamic memory device; and

decoding the first and second audio channel information.

2. The method according to claim 1, wherein the first audio channel information and the second audio channel information comprise similar audio information from adjacent sub-frames.

3. The method according to claim 2, wherein similar audio information comprises audio information corresponding to a particular range of audio frequencies.

4. The method according to claim 3, further comprising maintaining audio quality of transmitted audio information by receiving audio information in an interleaved state.

5. A system for de-interleaving audio information with static and dynamic buffers, the method comprising:

a first static memory device;

a de-interleaving engine;

a second static memory device;

a dynamic memory device; and

an audio decoder, whereby interleaved first audio channel information is written into the first static memory device, de-interleaved by the de-interleaving engine, written into the second static memory device, and temporarily stored in the dynamic memory device.

6. The method according to claim 5, wherein the interleaved first audio channel information is overwritten in the first static memory device by interleaved second audio channel information, the interleaved second audio channel information is de-interleaved by the de-interleaving engine, and the de-interleaved second audio channel information is written to the second static memory device.

7. The system according to claim 6, wherein the interleaved second audio channel information in the first static memory device is overwritten by the de-interleaved first audio channel information from the dynamic memory device.

8. The system according to claim 7, wherein the de-interleaved first and second audio channel information is decoded by the audio decoder.

9. The system according to claim 5, wherein interleaved audio information comprises similar audio information from adjacent sub-frames being associated in adjacent sub-bands.

10. The system according to claim 5, wherein similar audio information comprises audio information corresponding to a particular range of audio frequencies.

11. The system according to claim 5, wherein audio quality of transmitted audio information is maintained by receiving audio information in an interleaved state.

12. An application specific integrated circuit for de-interleaving audio information, the circuit comprising:

a first static memory device operatively connected to a de-interleaving engine;

a second static memory device also operatively connected to the de-interleaving engine;

a dynamic memory device operatively connected to the first and second static memory devices; and

an audio decoder operatively connected to the first and second static memory devices and the dynamic memory device, whereby interleaved first audio channel information is written into the first static memory device, de-interleaved by the de-interleaving engine, written into the second static memory device, and temporarily stored in the dynamic memory device.

13. The circuit according to claim 12, wherein the interleaved first audio channel information is overwritten in the first static memory device by interleaved second audio channel information, the interleaved second audio channel information is de-interleaved by the de-interleaving engine, the de-interleaved second audio channel information is written to the second static memory device.

14. The circuit according to claim 13, wherein the interleaved second audio channel information in the first static memory device is overwritten by the de-interleaved first audio channel information from the dynamic memory device.

15. The circuit according to claim 14, wherein the de-interleaved first and second audio channel information is decoded by the audio decoder.

16. The circuit according to claim 12, wherein interleaved audio information comprises similar audio information from adjacent sub-frames being associated in adjacent sub-bands.

17. The circuit according to claim 12, wherein similar audio information comprises audio information corresponding to a particular range of audio frequencies.

18. The circuit according to claim 12, wherein audio quality of transmitted audio information is maintained by receiving audio information in an interleaved state.

EVIDENCE APPENDIX

There are no pages in this Appendix.

RELATED PROCEEDINGS APPENDIX

There are no pages in this Appendix.